ABSTRACT

In a wireless communication network, the location of an addressable receiver relative to the locations of a plurality of addressable sources of electromagnetic radiation is found using probabilistic models of the signal strength measured at the addressable receiver. The inventive method provides location determination on a finer spatial scale than was heretofore available. A region of interest is calibrated via a discrete-space radio map storing probability distributions of received signal strength at the measurement locations. The stored probability distributions are compensated for temporal variability and biases, such as through temporal correlations of the sampled received signal strength. A measurement of the signal strength at the addressable receiver from each of the plurality of addressable sources is used in conjunction with the discrete-space radio map to identify one of the coordinates thereof that maximizes the conditional probability $P(x|\mathbf{s})$, where x is the radio map location and $\mathbf{s}$ is a vector of measured signal strengths. Small spatial scale variability can be compensated for using a perturbation technique. The method further implements a continuous-space estimator to return an estimated user location that falls between discrete-space radio map locations.